



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 13850:2014**  
**01-september-2014**

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**Varnost strojev - Zaustavitev v sili - Načela načrtovanja (ISO/DIS 13850:2014)**

Safety of machinery - Emergency stop - Principles for design (ISO/DIS 13850:2014)

Sicherheit von Maschinen - Not-Halt - Gestaltungsleitsätze (ISO/DIS 13850:2014)

Sécurité des machines - Arrêt d'urgence - Principes de conception (ISO/DIS 13850:2014)

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# DRAFT INTERNATIONAL STANDARD

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## Safety of machinery — Emergency stop function — Principles for design

*Sécurité des machines — Arrêt d'urgence — Principes de conception*

[Revision of second edition (ISO 13850:2006)]

ICS: 13.110

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### ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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## ISO/DIS 13850

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13850 was prepared by Technical Committee ISO/TC 199, *Safety of machinery*, and by Technical Committee CEN/TC 114, *Safety of machinery* in collaboration.

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## Introduction

The structure of safety standards in the field of machinery is as follows.

- a) Type-A standards (basic safety standards) give basic concepts, principles for design, and general aspects that can be applied to machinery.
- b) Type-B standards (generic safety standards) deal with one or more safety aspect(s) or one or more type(s) of safeguard that can be used across a wide range of machinery:
  - type-B1 standards on particular safety aspects (e.g. safety distances, surface temperature, noise);
  - type-B2 standards on safeguards (e.g. two-hands controls, interlocking devices, pressure sensitive devices, guards).
- c) Type-C standards (machinery safety standards) deal with detailed safety requirements for a particular machine or group of machines.

This International Standard is a type-B2 standard as stated in ISO 12100.

When provisions of a type-C standard are different from those which are stated in type-A or type-B standards, the provisions of the type-C standard take precedence.

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# Safety of machinery — Emergency stop function — Principles for design

## 1 Scope

This International Standard specifies functional requirements and design principles for the emergency stop function on machinery, independent of the type of energy used to control the function.

It does not deal with functions such as reversal or limitation of motion, deflection, shielding, braking or disconnecting, which can be part of the emergency stop function.

NOTE The requirements for the realization of the emergency stop function based on electrical/electronic technology are described in IEC 60204-1.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 4414, *Pneumatic fluid power — General rules and safety requirements for systems and their components*

ISO 11161:2007, *Safety of machinery — Integrated manufacturing systems — Basic requirements*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design*

IEC 60204-1:2009, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 60947-5-5:2005, *Low-voltage switchgear and controlgear — Part 5-5: Control circuit devices and switching elements — Electrical emergency stop device with mechanical latching function*

IEC 60417-DB:2002, Graphical symbols for use on equipment (on-line database)

IEC 61800-5-2, *Adjustable speed electrical power drive systems — Part 5-2: Safety requirements — Functional*

IEC 62061, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems*

## ISO/DIS 13850

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12100:2010 and the following apply.

#### 3.1

##### **emergency stop (E-stop)**

##### **emergency stop function**

function which is intended to

- avert arising or reduce existing hazards to persons, damage to machinery or to work in progress, and
- be initiated by a single human action

[SOURCE: ISO 12100:2010, 3.40.]

#### 3.2

##### **emergency stop equipment**

safety related parts of a control system which perform the emergency stop function

Note to entry: Typically emergency stop equipment is divided into input, processing and output elements.

#### 3.3

##### **emergency stop device**

manually actuated control device used to initiate an emergency stop function

[SOURCE: IEC 60947-5-5:2005, 3.2.]

#### 3.4

##### **machine actuator**

power mechanism of the machine used to effect motion

Note to entry: Example of machine actuators are motor, solenoid, pneumatic or hydraulic cylinder.

#### 3.5

##### **safety function**

function of a machine whose failure can result in an immediate increase of risk(s)

[SOURCE: ISO 12100:2010, 3.30.]

#### 3.6

##### **span of control of emergency stop device(s)**

predetermined section of the machinery under control of specific emergency stop device(s)

[SOURCE: ISO 11161:2007, 3.23, modified.]

#### 3.7

##### **protective shroud**

mechanical measure provided to prevent inadvertent actuation of an emergency stop device

#### 3.8

##### **emergency situation**

hazardous situation needing to be urgently ended or averted

Note to entry:

- An emergency situation can arise during normal operation of the machine (for example due to human interaction or as a result of external influences) or
- as a consequence of a malfunction or failure of any part of the machine.

[SOURCE: ISO 12100:2010, 3.38.]

**3.9****operator control station**

assembly of one or more control actuators fixed on the same panel or located in the same enclosure

Note to entry: Actuator is a part of a device to which an external manual action is to be applied (see IEC 60204-1:2009, 3.1).

[SOURCE: IEC 60204-1:2009, 3.13, modified.]

**4 Safety requirements****4.1 General requirements****4.1.1 Emergency stop function**

**4.1.1.1** The purpose of the emergency stop function is to avert actual or impending emergency situations arising from the behaviour of persons or from an unexpected hazardous event.

The emergency stop function is to be initiated by a single human action.

**4.1.1.2** The emergency stop function shall be available and operational at all times and override all other functions and operations in all operating modes of the machine without impairing other protective functions (e.g. release of trapped persons, fire suppression). When the emergency stop function is activated it shall be maintained until it is manually reset. It shall not be possible for any start command to be effective on those operations stopped by the initiation of the emergency stop function until the emergency stop function is reset by intentional human action. The reset of the emergency stop function operated by disengagement of an emergency stop device (see 4.1.4) shall not initiate the machine start up.

**4.1.1.3** The emergency stop function shall not be applied as a substitute for safeguarding measures and other safety functions but shall be designed and incorporated for use as a complementary protective measure.

The emergency stop function shall not impair the effectiveness of protective devices or of devices with other safety functions.

NOTE For this purpose, it can be necessary to ensure the continuing operation of auxiliary equipment such as magnetic chucks or braking devices.

**4.1.1.4** The emergency stop function shall be so designed, that after actuation of the emergency stop device, hazardous movements and operations of the machine are stopped in an appropriate manner, without creating additional hazards and without any further intervention.

NOTE An "appropriate manner" can include:

- choice of an optimal deceleration rate taking into account the necessary design restraints of the machine;
- selection of the stop category (see 4.1.3);
- the necessity for a predetermined shutdown sequence.

Depending on the machine and the specific risks, the emergency stop function can include functions other than stopping to minimize the risk of harm.

**4.1.1.5** The emergency stop function shall be so designed that a decision to activate the emergency stop device does not require the machine operator to consider the resultant effects.